

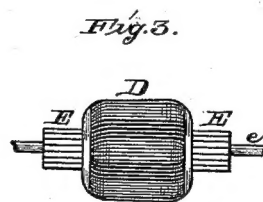
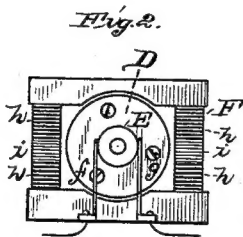
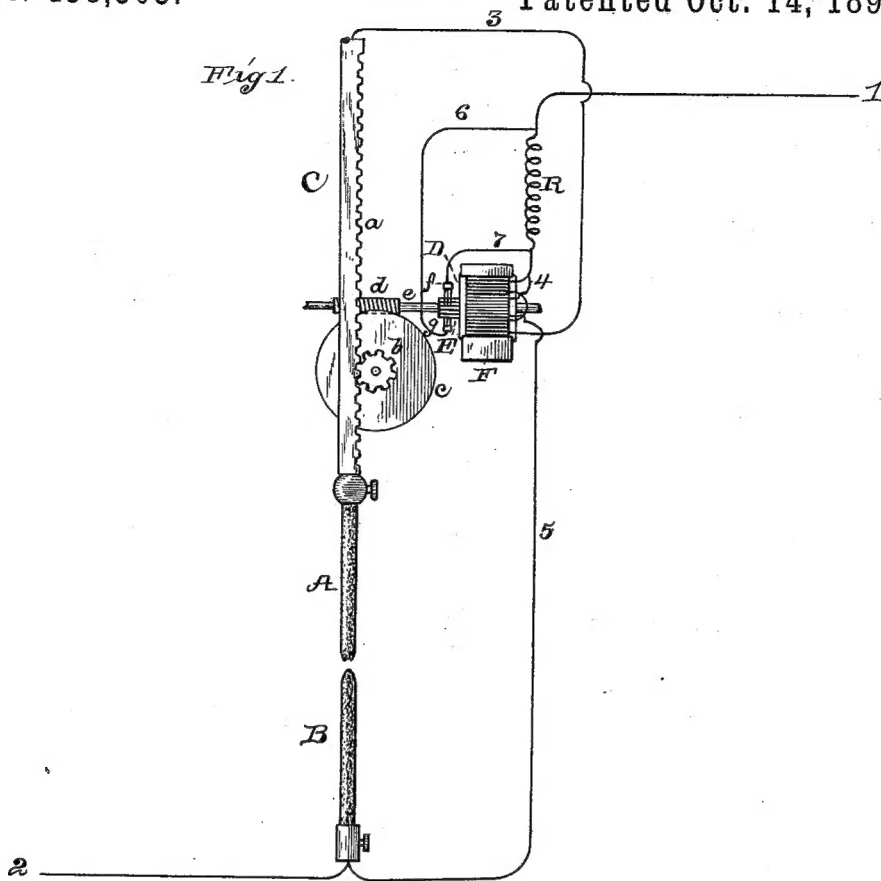
(No Model.)

2 Sheets—Sheet 1.

T. A. EDISON.
ARC LAMP.

No. 438,303.

Patented Oct. 14, 1890.



ATTEST:
McKiddell
Atty. Combs

INVENTOR:
Thomas A. Edison,
By Rich. T. Dyer
Atty.

(No Model.)

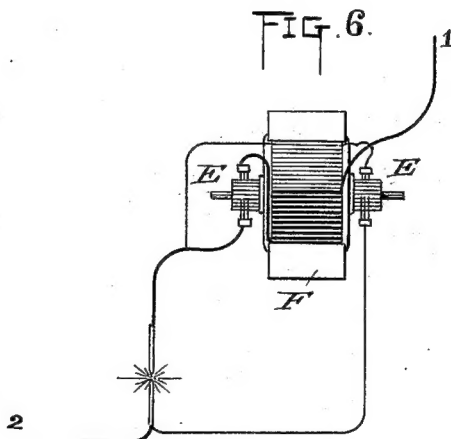
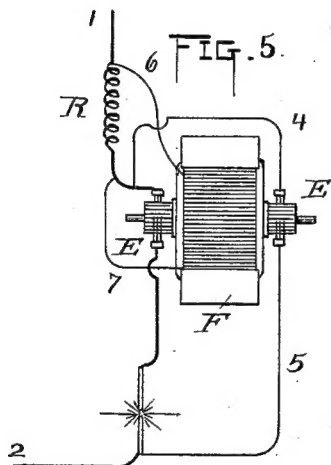
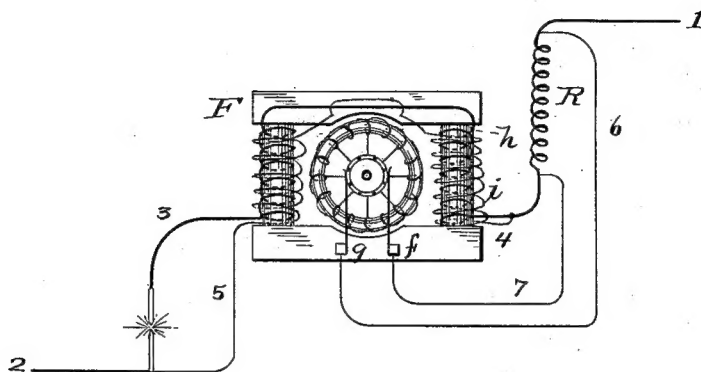
2 Sheets—Sheet 2.

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FIG. 4.



WITNESSES:

Richard
William R. J. W.

INVENTOR

Thomas A. Edison
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UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF MENLO PARK, NEW JERSEY.

ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 438,303, dated October 14, 1890.

Application filed June 10, 1884. Serial No. 134,246. (No model.)

To all whom it may concern:

Be it known that I, THOMAS A. EDISON, of Menlo Park, in the county of Middlesex and State of New Jersey, have invented a new and useful Improvement in Arc-Lamps, (Case No. 624,) of which the following is a specification.

The object I have in view is to produce a regulating mechanism for arc lamps which will move the carbon positively in both directions, preventing sticking of the carbon-holding rod, and making the mechanism independent of the position in which the lamp is placed, and which, while being extremely simple, will maintain an arc of uniform length without flicker of the light. This I accomplish by the employment of a small continuously-wound electro-dynamic motor of the Pacinotti or Siemens type, the armature of which is connected mechanically with the holding-rod of the upper carbon by a worm and worm-wheel or other speed-reducing gearing. The motor is provided with a compound differential winding of its field-magnet or armature, or both, one winding being of low resistance and the other of high resistance, and said two windings being located, respectively, in series with the arc and in a shunt around the same. The winding of lower resistance predominates in force when the carbons are in contact and causes the motor to turn in the direction to separate the carbons. This motion continues until the forces of the two windings are equal, when the motor stops. The further separation of the carbons causes the winding of higher resistance to exert the greater force and to turn the motor-armature in the direction to make the carbons approach. I prefer to use a simple Pacinotti or Siemens armature with a single Pacinotti commutator, and to provide the field-magnet with the compound differential winding, although the field-magnet may have a simple winding and the armature be provided with the double winding running to two commutators, or both constructions might be combined in the one motor. The motor will have enough turns in its armature-winding and sufficient commutator-bars to make it start at any point and to turn in either direction. The speed-reducing gearing makes it unnecessary to use dash-pots to regulate the

movement, and the entire mechanism is reduced to a point of great simplicity.

In the accompanying drawings, forming a part hereof, Figure 1 is a view, partly diagrammatic, of an arc-lamp embodying the invention; Fig. 2, a front view of the motor on a larger scale, and Fig. 3 a view of a motor-armature with a compound winding. Fig. 4 is a diagram showing the arrangement of circuits where the field-magnet has two windings; Fig. 5, a diagram showing the circuits for a double-wound armature; Fig. 6, a diagram of the circuits where both the magnet and armature are double wound.

A and B are the positive and negative carbons of the lamp, the former being carried by a sliding rod C. This rod is constructed as a rack with teeth *a*, with which engages a pinion *b*, secured on the same shaft with a worm-wheel *c*. A worm *d* on the armature-shaft *e* of the electro-dynamic motor turns the worm-wheel and moves the rod in one or the other direction, according to the way the armature of the motor revolves. This motor is of any suitable compact construction, the circuits of which are arranged as hereinafter described and claimed. Its armature *D* may be a ring or a cylinder with a continuous winding and a Pacinotti commutator *E*, upon which rest the commutator brushes or springs *f g*. The field-magnet *F* has a coarse-wire winding *h* and a fine-wire winding *i*. These are preferably one upon the other in layers, covering the magnet-cores from end to end; but these windings may be on different portions of the cores and are so shown for clearness.

The circuit-connections for the arrangement shown in Figs. 1, 2, and 4 are as follows: 1 and 2 are the main circuit-wires running to and from the lamp. The wire 1 extends to the coarse field-wire *h*, and from thence a connection 3 is made with carbon-holding rod C. This is the direct lamp-circuit. The shunt around the arc, including the fine-wire field-winding *i*, is made by wire or other connections 4 and 5. The armature is located in a shunt 6 7 around a resistance *R* in wire 1, the wires 6 7 running from opposite sides of this resistance to the commutator brushes or springs *f g*. Instead of having a compound field-winding, the armature may have a coarse

and fine winding running to two commutators, as shown in Figs. 3 and 5. With this construction the field-magnet coils are in the shunt around the resistance R, as shown. If
5 both a compound field and a compound armature are used, as shown in Fig. 6, this shunt-circuit is not employed; but the coarse windings are in series with the arc and the fine windings in the shunt around the arc.

10 What I claim is—

1. In an arc lamp, the combination, with the movable carbon-holding device, of an electro-dynamic motor operating the same, said motor having a double differential winding upon one part, the two windings being
15 located, respectively, in series with the arc and in a shunt around such arc, and a simple winding upon the other part of the motor

located in a shunt around resistance in the line, substantially as set forth.

2. In an arc lamp, the combination, with the movable carbon-holding device, of an electro-dynamic motor operating the same, a double differential winding upon the field-magnet of said motor, located in series with
25 the arc and in a shunt around such arc, and a simple armature-winding located in a shunt around resistance in the line, substantially as set forth.

This specification signed and witnessed
30 this 2d day of June, 1884.

THOS. A. EDISON.

Witnesses:

A. W. KIDDLE,
E. C. ROWLAND.